

Strategy Research Project

Organizational Systems Theory and Command and Control Concepts

by

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United States Army War College
Class of 2013

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REPORT DOCUMENTATION PAGE				Form Approved OMB No. 0704-0188	
<p>The public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing the burden, to Department of Defense, Washington Headquarters Services, Directorate for Information Operations and Reports (0704-0188), 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to any penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number. PLEASE DO NOT RETURN YOUR FORM TO THE ABOVE ADDRESS.</p>					
1. REPORT DATE (DD-MM-YYYY) xx-03-2013		2. REPORT TYPE STRATEGY RESEARCH PROJECT		3. DATES COVERED (From - To)	
4. TITLE AND SUBTITLE Organizational Systems Theory and Command and Control Concepts				5a. CONTRACT NUMBER	
				5b. GRANT NUMBER	
				5c. PROGRAM ELEMENT NUMBER	
6. AUTHOR(S) Colonel Hugh D. Shoults United States Army				5d. PROJECT NUMBER	
				5e. TASK NUMBER	
				5f. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Professor James W. Shufelt, Jr. Center for Strategic Leadership and Development				8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES) U.S. Army War College 122 Forbes Avenue Carlisle, PA 17013				10. SPONSOR/MONITOR'S ACRONYM(S)	
				11. SPONSOR/MONITOR'S REPORT NUMBER(S)	
12. DISTRIBUTION / AVAILABILITY STATEMENT Distribution A: Approved for Public Release. Distribution is Unlimited.					
13. SUPPLEMENTARY NOTES Word Count: 6666					
14. ABSTRACT <p>This paper explores how organizational systems theory applies to Command and Control (C2) concepts and how the theory can improve the application of C2 concepts in the U.S. Army doctrine of Mission Command. Studying C2 concepts in history illustrates how some armies planned and executed operations to the smallest detail (Detailed Command) while other armies allowed commanders to improvise execution (Mission Command). This paper then explores how a specific organizational systems theory by Charles Perrow can help explain why some military operations are appropriate for Detailed Command, and others are suited to Mission Command. Current Army doctrine accounts for both of these concepts in the Art of Command and the Science of Control, but lacks a proper model to assist commanders in determining how to correctly apply the concepts based on the operational environment. The paper concludes with a recommendation that the Army develop organizational systems theory into a tool to help commanders understand how the Art of Command and Science of Control should best be applied on the battlefield.</p>					
15. SUBJECT TERMS Mission Command, Detailed Command, Systems Engineering, Perrow					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT UU	18. NUMBER OF PAGES 40	19a. NAME OF RESPONSIBLE PERSON
a. REPORT UU	b. ABSTRACT UU	c. THIS PAGE UU			19b. TELEPHONE NUMBER (Include area code)

USAWC STRATEGY RESEARCH PROJECT

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Abstract

Title: Organizational Systems Theory and Command and Control Concepts

Report Date: March 2013

Page Count: 40

Word Count: 6666

Key Terms: Mission Command, Detailed Command, Systems Engineering, Perrow

Classification: Unclassified

This paper explores how organizational systems theory applies to Command and Control (C2) concepts and how the theory can improve the application of C2 concepts in the U.S. Army doctrine of Mission Command. Studying C2 concepts in history illustrates how some armies planned and executed operations to the smallest detail (Detailed Command) while other armies allowed commanders to improvise execution (Mission Command). This paper then explores how a specific organizational systems theory by Charles Perrow can help explain why some military operations are appropriate for Detailed Command, and others are suited to Mission Command. Current Army doctrine accounts for both of these concepts in the Art of Command and the Science of Control, but lacks a proper model to assist commanders in determining how to correctly apply the concepts based on the operational environment. The paper concludes with a recommendation that the Army develop organizational systems theory into a tool to help commanders understand how the Art of Command and Science of Control should best be applied on the battlefield.

Organizational Systems Theory and Command and Control Concepts

Army commanders apply the mission command philosophy to balance the Art of Command and the Science of Control ... The Science of Control is based on objectivity, facts, empirical methods, and analysis... The Art of Command [and] Mission Command philosophy effectively account for the nature of military operations... Through Mission Command, commanders initiate and integrate all military functions and actions toward a common goal—mission accomplishment.

Mission Command
Army Doctrine Reference Publication 6-0
September 10 2012

This paper explores how organizational systems theory applies to Command and Control (C2) concepts, explaining why some operations can be planned and executed down to the smallest detail (Detailed Command) while other operations do not last beyond first contact with the enemy, forcing the commander to improvise from the very beginning (Mission Command). Some operations in specific environments are suited to traditional, detailed, "engineering" methods of command; if not, the United States Army would have failed in many military operations over the years. However, other methods of military command require a broader mission and systems approach, as indicated by the recent emphasis on Mission Command.¹ Where the current Army doctrine of Mission Command is an appropriate command and control technique for most common military operations, it has relegated the concept of Detailed Command to a sub-category termed the Science of Control without proper definition.² In addition, Army doctrine fails to properly define where the Art of Command ends and the Science of Control begins, requiring additional modification to allow commanders to understand and determine which command and control technique to use based on the operational system requirements. Understanding how these approaches work in different environments will

help commanders and staffs determine the appropriate planning process and adapt Command and Control concepts to best fit the given operational environment. Adding this flexibility will help the Army's Command and Control doctrine cover all possible situations and types of operations that the U.S. Army can expect to face.

Detailed and Mission Command and Control Concepts in History

From ancient times until the 18th century, military commanders generally utilized what is now labeled as "Detailed Command" for control of their armies; this method was appropriate because weapon ranges were short, formations were compact, the commander could see most of the battlefield, his army, and the army of his enemy, and battles rarely lasted past sundown.³ However, following the French Revolution and the *levée en masse*, war grew larger and more complex, resulting in changes to the traditional methods of Command and Control as commanders allowed their subordinate leaders more freedom of action.⁴ During this time of tumult, Field Marshal Helmuth Karl Bernhard Graf von Moltke the Elder, Chief of the Prussian General Staff from 1857-1888, coined one of the great truisms in military tradition: *"No battle plan ever survives contact with the enemy."* Moltke was in fact a very detailed planner, yet he believed the plan would only get forces to the battle. Once it was joined, the subordinate commander, who understood the final desired end state, would use personal initiative to quickly adapt and improvise to unforeseen variables.⁵ In contrast, Antoine-Henri Jomini (French and Russian General, 1779–1869) believed battle could be treated as a science. With a thorough knowledge of the Principles of War and detailed planning, commanders could engineer the defeat of the enemy.⁶ Executing such a detailed plan required the subordinate leaders to rigidly adhere to their commander's orders and time schedules.

The two theories continued to develop into the 20th Century. During the First World War the German Army, in an attempt to break the stalemate of the trenches, tactically implemented the concept from von Moltke of allowing subordinates to use personal initiative. The Germans of the First World War took this concept even further, by pushing authority to the squads and platoons, and by utilizing small units maneuvering independently to swarm the allied defenses, find weaknesses, and develop breakthroughs. The technique was later termed *Auftragstaktik* (mission tactics).⁷ In stark contrast, the French Army learned a completely different lesson from the war in the trenches and adopted a Detailed Command doctrine with rigid movement corridors and preplanned artillery preparations termed *Bataille Conduite* (methodical battle).⁸ An example of the range of these two command and a control concept is shown by Figure 1.

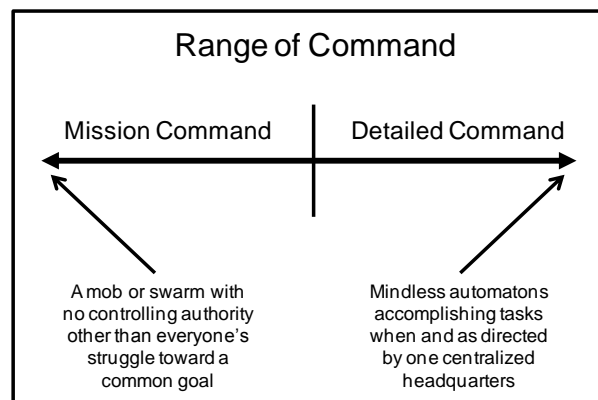


Figure 1. Range of Command with Polar Extremes⁹

Command Concepts in the United States Army

United States Army Command and Control doctrine, as it developed in the 19th Century, was based heavily on the works of Jomini as translated by West Point Professor, Dennis Hart Mahan.¹⁰ Although the command techniques that developed

during and after the Civil War were more flexible than a pure Jomanian would expect, they continued to resemble Detailed Command well into the 20th Century.¹¹ While the US doctrine during the Cold War was never as inflexible as the Soviet concept of Detailed Command, the crowded, linear battlefields of Central Europe lend to a more set-piece, orders-driven command concept.¹²

In the 1980s and 1990s, several American military leaders began to advocate for a new Command and Control concept that resembled *Auftragstaktik* and became known by such names as *Maneuver Warfare* and *Mission Tactics*.¹³ Although the Army was resistant at first, the Maneuver Warfare proponents pursued their mission with religious zeal.¹⁴ Eventually these efforts developed into the current Army "Mission Command" doctrine and all traces of "Detailed Command" were stricken from the Army's language¹⁵.

The U.S. Army's current version of Mission Command is defined as the "exercise of authority and direction by the commander using mission orders to enable disciplined initiative within the commander's intent to empower agile and adaptive leaders in the conduct of unified land operations."¹⁶ This command concept recognizes the human dimension of war and attempts to find a human solution to complex operational challenges.¹⁷ Mission Command recognizes the enemy is not an inanimate object, but another independent force that actively resists and has its own goals and intent. Recognizing that the Army's enemies are adaptive, that the civilians on the battlefield are changing in their perceptions and allegiances, and that friendly commander cannot possibly predict all that will happen or what effects a particular action will cause, is a major change from the Jomanian concept of "war as a science".

However, the new doctrine is not a pure version of *Auftragstaktik* and still retains many of the earlier operational concepts of Detailed Command, as the Mission Command Philosophy “balances the Art of Command with the Science of Control .”¹⁸ The Art of Command is used to exercise authority, provide leadership, and make timely decisions. The Science of Control regulates forces and directs the execution of operations to conform to their commander’s intent.¹⁹ Commanders and staff still develop detailed plans, but they “describe” rather than “order” their staffs and subordinate commanders.

Designing	Engineering
<ul style="list-style-type: none"> • Problem framing • Start with a blank sheet • Questions the limits of existing knowledge • Questions assumptions and method • Conceptual • Develops understanding • Paradigm setting • Complements planning, preparation, and assessment • Output: a broad approach to problem solving (a design) 	<ul style="list-style-type: none"> • Problem solving • Start with a coherent design or plan • Functions within the existing paradigm • Follows established procedure • Physical and detailed • Develops products • Paradigm accepting • Patterns and templates activity • Output: detailed plan for action (blueprints)

Figure 2. A Comparison of the Cognitive Processes in Designing and Engineering²⁰

In the Mission Command Warfighting Function, commanders provide the art as they attempt to understand, visualize, describe, direct, lead and assess. The staffs support the commander with the science as they plan, prepare, execute, and assess. Army operations are still planned using the detailed Military Decision Making Process (MDMP) to analyze the operational problem and engineer a solution by selecting a Course of Action (COA) for implementation.²¹ Commanders still develop detailed plans, but they “describe” rather than “order” their staffs and subordinate commanders.

Commanders and staffs use assessment to attempt to understand if their actions are causing the desired effect.

With the adoption of the Mission Command concept, the Army is admitting that no plan will survive contact with the enemy without explaining why this occurs. Instead, an operation is only a few hours old when unforeseen events force commanders and their staffs to improvise new solutions on the fly. This cycle of react and counter react can quickly lead to the execution of an operation that bears little resemblance to the plan. Most leaders realize this is a product of a complex operational environment and don't blame the planners for poor staff work. "The plan from MDMP gives us a starting point to adjust from" the leaders say, even if the operational environment is too complicated to plan for all eventualities. However, in many situations they are cheating themselves by limiting their choices to one command and control concept.

Embracing the idea of Mission Command and forgoing the order of Detailed Command is an extreme reaction and assumes that one (Mission Command) cannot exist without eliminating the other (Detailed Command). Rather, the Army should attempt to develop doctrine that allows leaders the flexibility to tailor their operational command and control framework to face the greatest range of possible operational scenarios. Past Army publications have tried to address the issue by looking at different methods of framing complex problems and designing possible solutions that used both an engineering and designing approach to Command and Control.²² In a complex environment, commanders should employ operational art through a process of design, using a broad approach to evaluate a complex problem and feedback to learn, adjust, and develop the situation. In a less complex environment, commanders should use an

engineering approach with detailed plans and top-down Command and Control to ensure that plan is properly synchronized and executed. Figure 2 compares the Designing and Engineering methods of planning.

<div> <div>←</div> <div>Mission Command</div> <div>→</div> </div> <div> <div>←</div> <div>Detailed Command</div> <div>→</div> </div>		
<ul style="list-style-type: none"> • Probabilistic • Unpredictable 	Assumes war is	<ul style="list-style-type: none"> • Deterministic • Predictable
<ul style="list-style-type: none"> • Disorder • Uncertainty 	Accepts	<ul style="list-style-type: none"> • Order • Certainty
<ul style="list-style-type: none"> • Decentralization • Spontaneity • Informality • Loose rein • Self-discipline • Initiative • Cooperation • Acceptable decisions • faster • Ability all echelons • Higher tempo 	Tends to lead to	<ul style="list-style-type: none"> • Centralization • Coercion • Formality • Tight rein • Imposed discipline • Obedience • Compliance • Optimal decisions, but later • Ability focused at the Top
<ul style="list-style-type: none"> • Implicit • Vertical and horizontal • Interactive 	Communication types used	<ul style="list-style-type: none"> • Explicit • Vertical • Linear
<ul style="list-style-type: none"> • Organic • Ad hoc 	Organization types fostered	<ul style="list-style-type: none"> • Hierarchic • Bureaucratic
<ul style="list-style-type: none"> • Delegating • Transformational 	Leadership styles Encouraged	<ul style="list-style-type: none"> • Directing • Transactional
<ul style="list-style-type: none"> • Art of war • Conduct of operations 	Appropriate to	<ul style="list-style-type: none"> • Science of war • Technical/procedural tasks

Figure 3. Concepts of Command and Control²³

In fact, U.S. Army doctrine hasn't always limited commanders to a single Command and Control concept. A now-obsolete version of Field Manual 5-0, *The Operations Process*, defines both Command and Control concepts, Detailed Command and Mission Command (Figure 3), and indicates commanders can choose which method to use based on the situation.²⁴ Detailed Command centralizes information and decision making authority; orders and plans are specific and detailed as they attempt to impose order and certainty on the battlefield. Mission Command, the Army's preferred

method, as defined in Army Doctrine Publication (ADP) 5-0, ADP 6-0, and Army Doctrine Reference Publication (ADRP) 6-0, uses decentralized execution based upon plans that stress mission orders where subordinate leaders exercise disciplined initiative within the commander's intent to accomplish the mission.²⁵

Is the doctrine of having two types of Command and Control concepts valid? If commanders are going to use two types of Command and Control concepts, how will they know which to use and when to use them? In fact, Command and Control in complex systems is not unique to military operations, and has been extensively explored in business, industry, and academia. Looking at a systems theory that attempts to explain how different complex systems interact and what techniques are useful in operating within these complex systems may enlighten military leaders who must operate in complex military systems.

An Organization Systems Theory

Charles B. Perrow, an emeritus professor of sociology at Yale University and visiting professor at Stanford University, has authored several books and articles on organizations and the impact of large organizations on society. His premier works, *Complex Organizations: A Critical Essay*²⁶ and *Normal Accidents: Living With High Risk Technologies*²⁷ were two of the first studies to explore organizations as complex systems and analyze how different systems required different approaches to best ensure successful operation²⁸. These works provide a detailed framework to help strategic leaders to understand the complexity of various military missions and how to structure and tailor a command concept to manage operations in a Volatile, Uncertain, Complex and Ambiguous (VUCA) environment.²⁹

Charles B. Perrow is not, by any means, the only complex systems theorist. However, he is one of the first to attempt to frame complex systems, and therefore his theories are very broad and applicable to many environments. Subsequent researchers have focused on the most complex systems without studying systems that do not apply directly to industry or safety.³⁰ Therefore, using Perrow as a base will allow this paper to develop a framework that will translate to military command concepts.

In Perrow's Organization Systems Theory, a "system" can refer to almost anything; a unit, a population, a business, an operation, or even an operational environment. An operations may be a single system, or a group of multiple sub-systems, each with a different set of characteristics. In Complex Organizations: A Critical Essay, Dr. Perrow explains how complex systems can be plotted by the way they interact and how they are coupled.³¹

Coupling

Coupling refers to the way components (parts, units, and sub-systems) within a system react to each other.³² In a tightly coupled system there is no slack between components. Each component directly affects the component adjacent to it. An internal combustion engine is an example of a tightly coupled system, where each part directly acts with the parts around it, and if one part changes or fails there is an immediate reaction to those changes with the other parts. A fish in an aquarium is an example of a loosely coupled system. Occasionally fish interact with other fish, at other times they do not. If one fish dies, it may take a while before the other fish notice.

Interaction

Interaction refers to the parts, or components, in that system and how they react to one another. Linear Interaction describes components that react in a predictable way

with the next component, like the way an automotive assembly line progresses from one predictable stage to the next. Regardless of the number of individual components (whether it be 100 or 10,000) it is possible to predict final results with a high degree of accuracy. Complex Interaction describes a system of components that react in multiple- or unknown--ways with each other, like a single event in the stock market can have multiple and unexpected effects . Each component may react differently with other components, and may have multiple reactions. Predictability becomes difficult and even impossible in such a volatile environment.

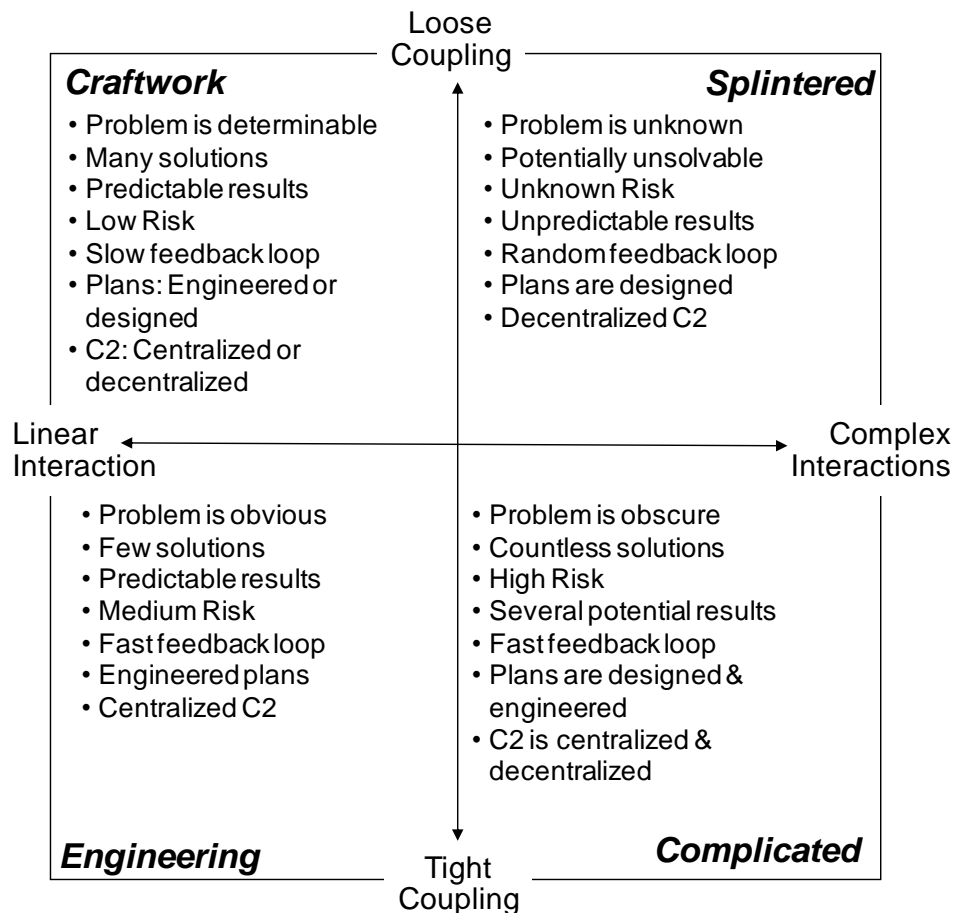


Figure 4. A Perrow Interaction/Coupling Chart

Figure 4 shows a Perrow Interaction/Coupling graph.³³ The Y axis represents the scale of coupling from Loose to Tight, and the X axis the interaction, from linear to complex. This graph is divided into four quadrants, each with its own characteristics. For this example, the quadrants are named the Engineering, Craftwork, Complicated, and Splintered Quadrants.

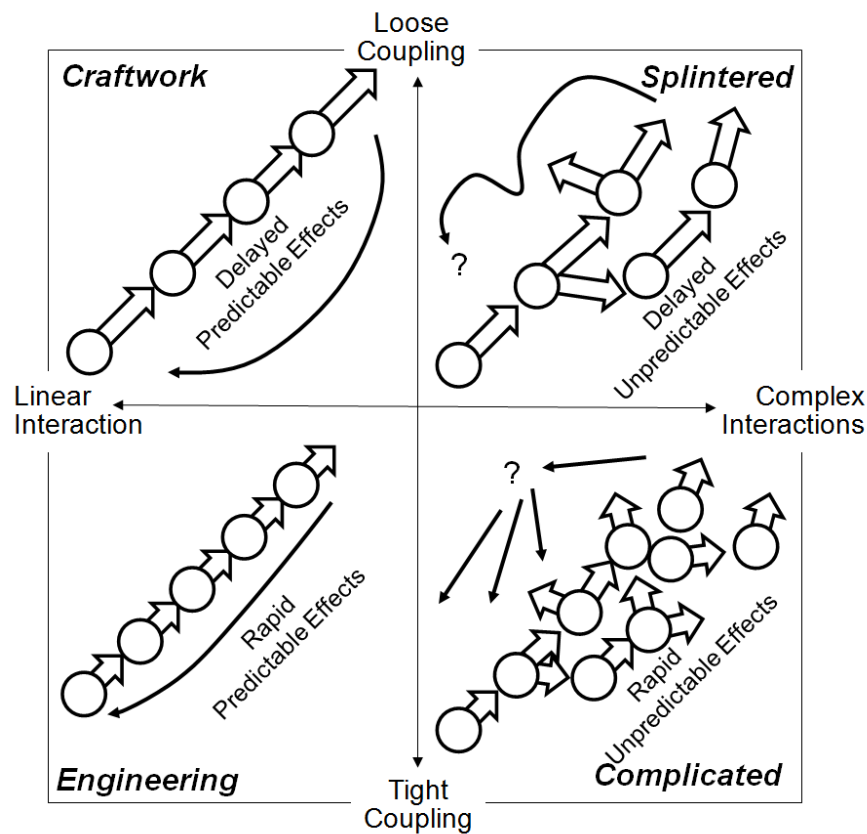


Figure 5. Coupling and Effects Predictability

Engineering Quadrant

Linear Interaction and Tightly Coupled components allow for predictable effects. Systems within the Engineering Quadrant most resemble the concept of systems as a machine.³⁴ An example for this might be an assembly line or a Basic Combat Training company. There may be different ways to operate these systems, but there are only a

few that work really well. Detailed planning is effective because the predictable interaction of the various components and their tight coupling make the problem obvious. Command and Control's primary input during execution is to make

adjustments when something breaks down or gets in the way. If something is changed it is obvious because the tight coupling lends to rapid feedback. Because of the tight coupling, the system is at risk of failure should one or more components fail. However, the quick feedback loop helps make the systems predictable and amenable to an engineering solution.

Craftwork Quadrant

A loosely coupled system consisting of linear interactions is least likely to encounter catastrophic failure. The linear interactions of its components make it somewhat predictable, although less so than the Engineering Quadrant, and the loose coupling affords the slack to recover from setbacks and discover new solutions. An example here would be a custom motorcycle shop, where a product—the motorcycle—that might normally be made on a time-sensitive and controlled assembly line is instead carefully crafted by artist-mechanics who loosely follow schedules and procedures to create a one-of-a-kind machine. Engineered solutions and centralized control will still work, but may not result in the desired product the way a Designed solution and decentralized control--allowing subordinates the freedom to invent their own solutions--would.

Splintered Quadrant

A Loosely Coupled system with Complex Interactions results in unpredictable effects and the quintessential environment of unintended consequences.³⁵ Operations in the Splintered Quadrant require a decentralized and adaptive approach to operations.

Detailed Command here will prevent subordinates from devising and reacting to unpredictable circumstances. The extreme complexity and loose coupling results in an environment that is even less predictable than the Complicated Quadrant. Not only is a solution hard to find within this realm, but the problem may be difficult to find as well. The most obvious example in this quadrant would be the World Stock Market. There are as many theories of how it works as there are experts thinking about it. No matter how hard they work to turn the World Stock Market into a science, it defies logic. It is too complex with too many unknown components acting on one another in seemingly random ways. The feedback loop is unknown. Something that happens today might cause price to plummet this afternoon, or may not be felt until next November. A system as dynamic as those represented in the Splintered Quadrant may be at risk of a systems failure, but the event that causes the failure may not be readily apparent to those observing the system.

Complicated Quadrant

When the interactions are complex and tightly coupled, the system is unpredictable and at high risk of systems failure. Systems in this region have the characteristics of systems using cutting-edge technology, such as nuclear reactors or NASA space programs. Tight coupling implies detailed planning and directive Command and Control. Ironically, this only causes tighter coupling, further compounding the problem. The paradox is that the complex interactions could be solved by using a decentralized approach, but the tight coupling cause rapid cascading of effects throughout the system that require Detailed Command. Perrow claims that the complex, tightly coupled systems in this region will--at some point--fail, such as the Challenger space shuttle disaster in 1986. In this example, policies at NASA led to

mission leaders launching the shuttle in cold weather even though several subordinates were convinced it was too risky for launch, but could not adequately express their concerns because the extreme complexity of the system defied prediction.

Unfortunately, the cold weather led to a failure in a rubber O-ring that caused cascading effects resulting in the explosion of a solid rocket booster and destruction of the shuttle.

Another example of a complicated systems failure Perrow studied is the Three Mile Island nuclear reactor accident in 1979. An initial failure in a non-nuclear secondary system was followed by a stuck-open valve in the primary system, which then allowed large amounts of nuclear reactor coolant to escape. The mechanical failures were compounded by the failure of plant operators to recognize the loss-of-coolant accident due to inadequate training, human factors, and control room design flaws. An example is a hidden indicator light that led to a manual override of the automatic emergency cooling system because operators incorrectly believed there was too much (when there was in fact too little) coolant water present.

In both of these examples, the tremendous complexity of the systems seems to require both a centralized and decentralized command approach; centralized command to ensure personnel adhere to correct policies and procedures, and decentralized command to ensure subordinates have authority to take appropriate emergency action. In fact, the organization and systems require both centralized and decentralized command. Organizations that operate well, even if they experience setbacks within this realm, are known as High Reliability Organizations (HRO).³⁶ They are able to mitigate the risk by training and education, maximizing systems feedback, and a high degree of flexibility. HROs allow subordinates to take action, but ensure they coordinate with a

centralized authority to ensure the action taken in one system does not adversely affect adjacent systems.

Time and Planning Horizons in Complex Systems

Time is not a determining factor on where an operation will fall within the table. A tightly coupled and linear system (such as an assembly line) can operate for several years in a linear environment while a complex operation, such the invasion of Normandy, might last only a few hours or days. However, because time itself tends to add complexity, short operations are more likely to be less complex than ones of longer duration. Likewise smaller operations (raid, etc) are less complex than large scale campaigns, but scale itself is not a determining factor.

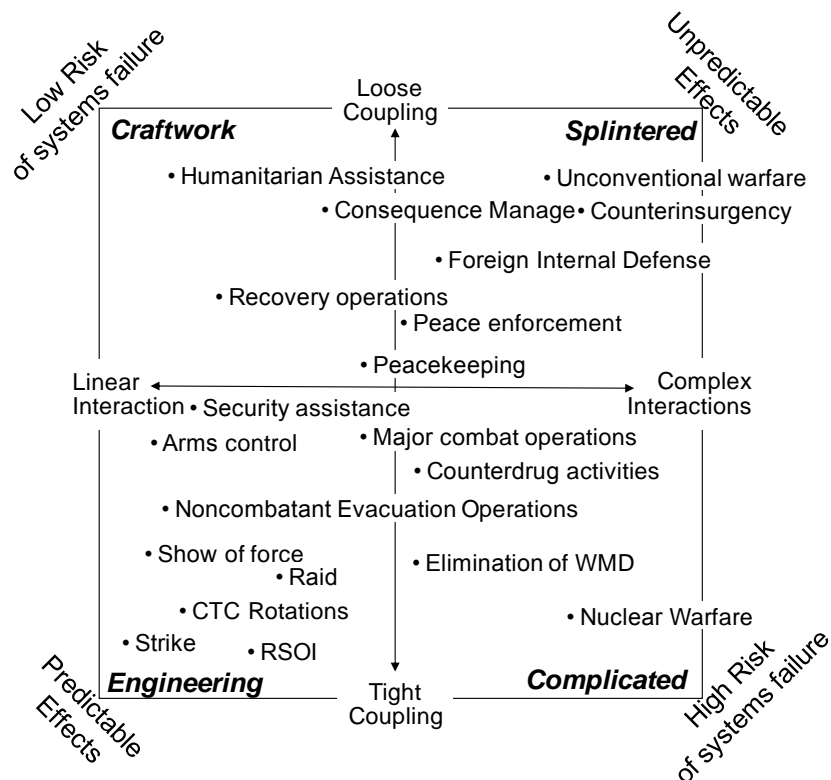


Figure 6. Variation of a Perrow Interaction Coupling Chart with possible Military Operations, Effect Predictability, and Risk³⁷

The better way to measure a system is by temporal horizons. The planning horizon will take the operation thru to fruition, whether that is measured in hours (a raid) or years (a campaign). The tempo of the feedback loop will be long or short in relation to the overall temporal horizon and based on how tightly coupled the system is.

Perrow Interaction/Coupling and Military Applications

Figure 6 is a variant of a Perrow systems interaction and coupling graph divided into the same four quadrants, but with a selection of combat operations plotted where they might fall on this scale. Of course, the exact placement of these could be argued indefinitely. There are thousands of variations operations that could, under various circumstances, plot in an entirely different quadrant.

Within a campaign, specific operations can be plotted in this graph to give commanders and staffs an idea of where the operation falls within the system and what command concept style would best be used to achieve success.

Military Operations in the Engineering Quadrant

A raid is an example of an operation in the Engineering Quadrant. The conduct of a raid generally has Linear Interaction and lends itself to Engineered Planning (traditional MDMP) and Detailed Command. Specific operations orders, execution checklists, multiple rehearsals, and centralized, Detailed Command and Control result in an efficient, synchronized, and unified operation. Mission Command and Designed Planning will not be an effective Command and Control method for an operation in this quadrant. A decentralized approach will be unsophisticated and result in piecemeal execution; the linear interaction offers a narrower band of acceptable solutions and the tight coupling requires centralized command to react to the quick feedback loop. Operations in the quadrant would best be accomplished by Detailed Command.

Military Operations in the Craftwork Quadrant

An operation in the Craftwork Quadrant has linear interactions and loosely coupled components, which result in somewhat predictable effects. Execution can be decentralized. For instance, the overall problem and final end state of a Humanitarian Assistance operation is usually obvious; get whatever aid is needed to the people in need (linear interaction). However, loosely coupled components--that include multiple agencies and non-governmental organizations--result in multiple solutions with "slack" that allows reasonable feedback and flexibility in the system. Both Detailed Command and Mission Command will work here. Commanders would make their decision on the Command and Control method to use based on the intangibles, such as the experience of their subordinate commanders, the cohesiveness of their units, or the effectiveness of their staffs.

Military Operations in the Splintered Quadrant

Possibly the most common environment for military leader to operate in is the Splintered Quadrant, which is possibly the reason for the current push toward a Mission Command doctrine. The Loosely Coupled and Complex environment is so unpredictable that even experts cannot agree on the problems, much less the solutions. The obvious example is operations within a Counter Insurgency. Like the stock market, there are many theories, but no easy answers. Commanders and staffs must realize from the start that no matter how good their staff work, no matter how late the planners stay up at night, it is impossible to get all the answers. Plans must be designed and Command and Control must be decentralized. Multiple COAs should be tried because any of them could work. Due to the random feedback loop, leaders must persist in executing these COAs. Some may work in this district, but not in another, and only

empowered subordinate commanders will be able to find them. Finally, feedback into the system is critical. Leaders must be open to learning and must constantly reassess their assumptions and desired end state.

Military Operations in the Complicated Quadrant

Operations in the Complicated Quadrant are, as mentioned earlier, high risk. The rapid feedback and requirement to act swiftly in an emergency implies the use of Mission Command, but the interconnectivity of the system requires all action be synchronized implies Detailed Command. An example of a military operation in the Complicated Environment might be the Cold War era Able Archer 83 exercise that nearly escalated to Nuclear Warfare. The 1983 NATO command post exercise simulated a period of conflict escalation, culminating in a coordinated nuclear release. Unfortunately, the realism of the exercise, coupled with deteriorating relations between the United States and the Soviet Union caused Soviet leaders to believe that NATO was preparing a preemptive nuclear first strike, and they placed their nuclear forces on alert. Events that followed over the next few weeks could have easily caused a nuclear exchange and Able Archer was possibly the closest the world has come to Nuclear War.³⁸

Fortunately for military leaders, there has been a lot of study of High Reliability Organizations (HROs), and the Army has adopted some of the characteristics that allow them to operate in a tightly coupling and complex environment. HROs are preoccupied with failure and must, due to the fast feedback loop, look at anything new as a potential for disaster. HROs understand they are in a complex environment and resist the temptation to simplify concepts to "get their arms around a problem". Finally, HROs rely heavily on training and education and allow the trained individual with the most

expertise in a given situation to call the shots. Mission Command attributes, such as diversity, different points of view, and "thinking outside the box", must be encouraged as it is impossible to plan for every eventuality. Detailed Command attributes, such as planning, quick and synchronized reaction, and the ability recover from setbacks are equally important.

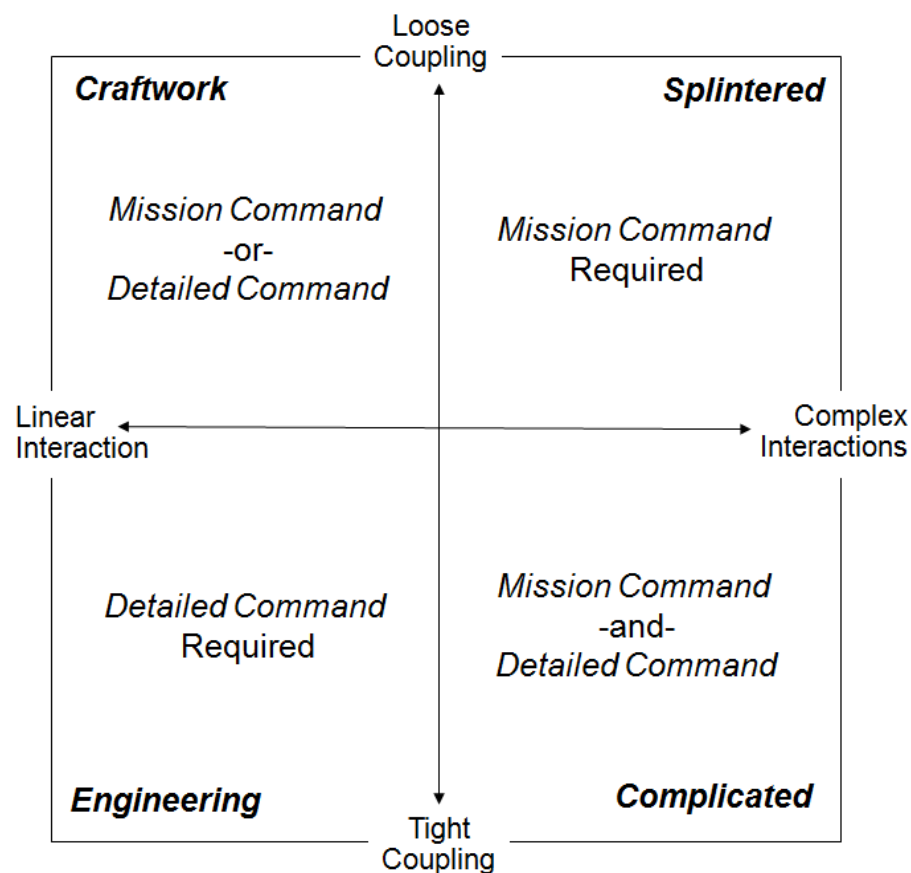


Figure 7. Command and Control concepts required based on interaction and coupling.

Perrow Interaction/Coupling and Military Command and Control Concepts

The Command and Control Concepts used during a military campaign should vary based on the system environment that the command is operating in. Because a campaign is a series of related military operations aimed at accomplishing a strategic or operational objective within a given time and space, commanders shouldn't consider

they can use the same command concept throughout the campaign.³⁹ Each operation is both a system unto itself and also a component of the larger system that encompasses the entire campaign.

Campaign designers and military planners at all levels should evaluate each operation to determine the interaction and coupling, and decide which command concept should be used (Figure 7). For example, a counter insurgency, as already noted, will mostly rest in the Splintered Quadrant. However, operations within the overall campaign may fit in any of the Perrow quadrants, and will likely span quadrants at different levels of command.

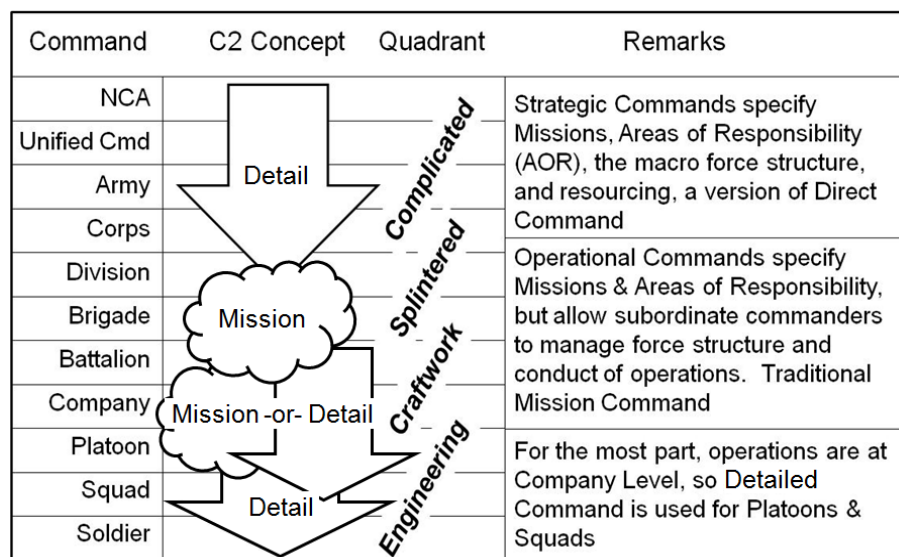


Figure 8. Example of Range of Command: Counterinsurgency

At the strategic level, a counterinsurgency is unstable, often with unfriendly neighboring nations and replete with political pitfalls. The problems are obscure, the solutions are not obvious, and the price for failure is high. At the strategic level it is a Complicated Quadrant system, and the leaders are more apt to use Detailed Command with their subordinates. At the operational level, however, operations are loosely

coupled with lower risk, attributes of a Splintered Quadrant System. While the problems are still obscure, results are achievable. Therefore, to be effective a more decentralized method of Command and Control is required. Commanders must use Mission Command like a conceptual Movement to Contact in order to discover what effects can be achieved by which actions, with the understanding that what works in one valley or town may not work in the next valley of town. This is the nature of a VUCA environment. However, the companies and platoons operating in those valleys and towns are experiencing a more linear operational environment, the Craftwork Quadrant. Commanders at this level can use either Detailed or Mission Command, and should base their decision on the experience and maturity of their subordinate leaders. Finally, at the lowest tactical levels, in this hypothetical scenario at least, the junior officers and NCO are using Detailed Command and Control.

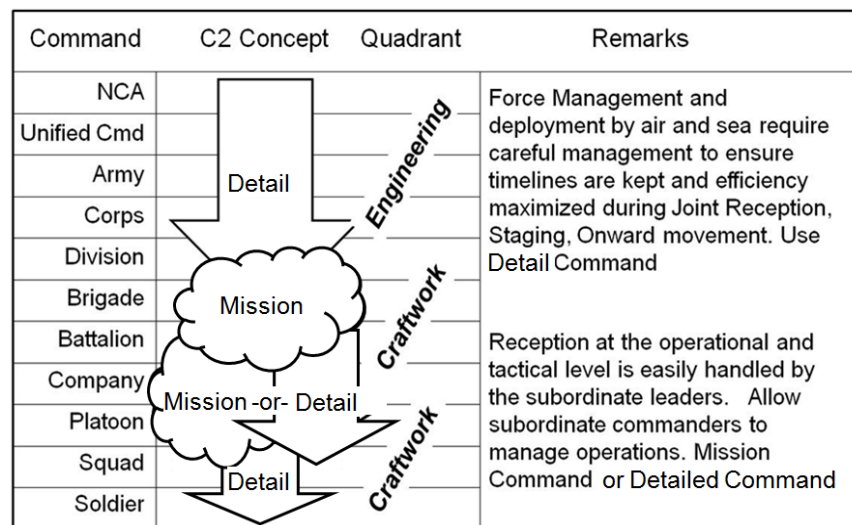


Figure 9. Example of Range of Command: Joint Reception, Staging, Onward movement, and Integration (JRSOI)

In another example, Joint Reception, Staging, Onward movement, and Integration (JRSOI) at the strategic level is a very tightly coupled and linear system

(Engineering Quadrant). Mobilization, force management and deployment by air and sea must be carefully managed to ensure timelines are maintained and efficiency maximized. Even at the higher operational level, Joint Reception, Staging, and Onward movement is a very linear and tightly coupled system from the Engineering Quadrant. Utilizing Mission Command for this portion of JRSOI would cause bottle necks in the system, therefore Detailed Command and Control is the correct and effective Command and Control concept. However, reception at the lower operational and tactical level less linear (Craftwork Quadrant) and is easily handled by the subordinate leaders using either Mission or Detailed Command.

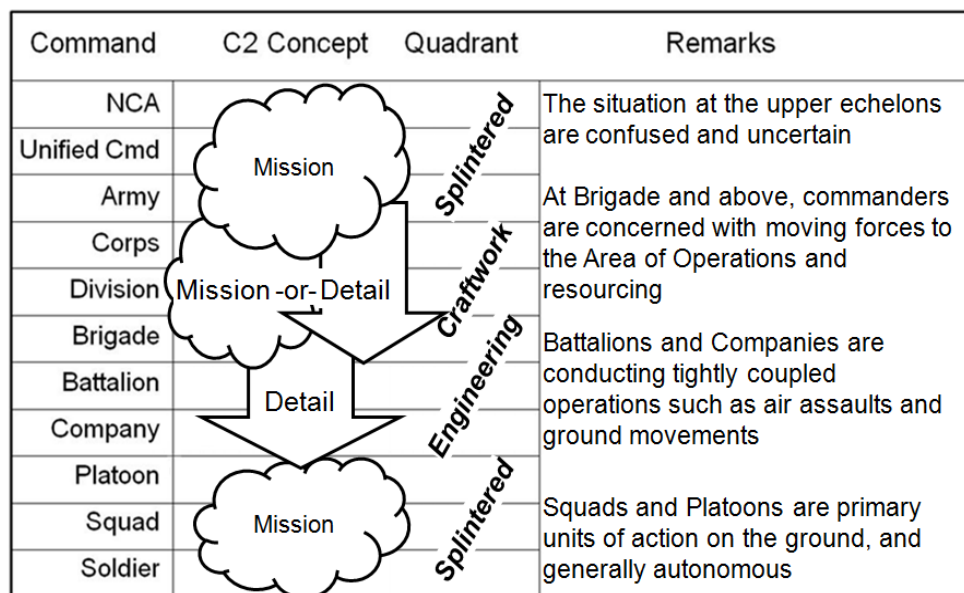


Figure 10. Example of Range of Command: Non-Combatant Evacuation Operation (NEO)

At the strategic level, the Non-Combatant Evacuation Operation (NEO) may be uncertain and unpredictable. Once the decision is made to, in this hypothetical scenario, evacuate U.S. citizens from a third-world country, the leaders and commanders above Corps level use Mission Command to their subordinates to

recourse forces and determine specific missions and objectives. At Corps, Division, and Brigade level, commanders are concerned with deploying forces to the Forward Operating Base and resourcing those forces, and can use either Detailed or Mission Command. Battalions and Companies are determining specific tactical objectives and conducting tightly coupled operations, such as air assaults and ground convoys, therefore using Detailed Command. Finally, Squads and Platoons are the primary units of action and are using Mission Command.

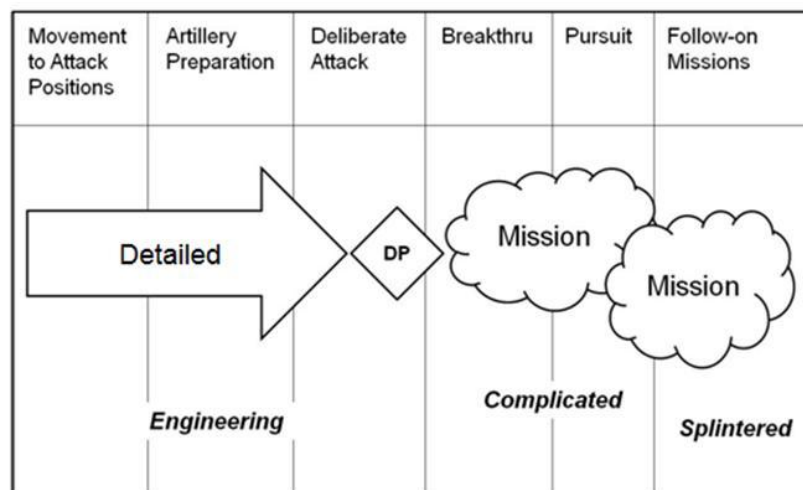


Figure 11. Time/Phase Considerations

Time/Phase Considerations

To further complicate operations, the Command and Control Style may best if it changes based on the time/phase of the operation (Figure 11). An example of this is the 1967 attack on the fortress of Abu-Ageila, Egypt. Israeli General Ariel Sharon utilized Detail Command of his forces prior to and during the attack on the fortified positions to ensure unity of command, mass of forces, and synchronization of fires (Engineering Quadrant). As soon as the Egyptian defenses began to give way, Sharon initiated a

pre-planned reversion to Mission Command to allow his subordinate Commanders to achieve breakthrough and pursue exploitation (Craftwork and Splintered Quadrants).⁴⁰

When to use which Command and Control Concept

Perrow's systems theory demonstrates how a single operation can contain several different systems and require different Command and Control concepts both vertically through the echelons of command as well as horizontally through time and phases of the operation. Understanding this allows commanders to develop a mental framework to assist in tailoring their Command and Control techniques to gain unity of command and mass effects when possible, yet provide initiative to subordinates to achieve synergy and rapid execution when needed. By applying the appropriate Command and Control concept in the correct situation, commanders can maximize positive effects while minimizing risk.

Another key to understanding whether Detailed Command, Mission Command, or both is appropriate is obtained by examining the assessments that are required by both staff and commanders in the current Mission Command doctrine.⁴¹ Assessments are critical for operational systems that plot in any of the four Perrow quadrants. However, not all systems are predicable and not all systems provide understandable feedback and timely feedback. In loosely coupled systems (Craftwork and Splintered Quadrants) the feedback takes longer and requires tactical patience. In systems with complex interaction (Splintered and Complicated Quadrants) the feedback may be false as to the actual problem, and requires flexible Command and Control with multiple COAs. In a system that is both tightly coupled and complex (Complicated Quadrant) the feedback is rapid, incomplete, and unpredictable, forcing commanders to use both Mission and Detailed Command. Empowered subordinate leaders who are close to the

action and granted the authority to react quickly (Mission Command) can develop unique solutions. However, a central commander must synchronize the efforts across the subordinate commands (Detailed Command) to prevent subordinate activities from adversely affecting each other and ensure a synchronized and unified effort.

Evaluation of Current Mission Command Doctrine

Mission Command as Army doctrine is in its infancy and requires continued development and evolution. Currently, uncertainty in determining how commanders balance the Art of Command and the Science of Control creates cognitive dissonance and may increase confusion and misunderstanding across commands and staffs, creating increased operational risk. The two primary Army Mission Command doctrinal publications, ADP 6-0 and ADRP 6-0, state that commanders will use *Mission Command Philosophy* to balance the Art of Command and the Science of Control.⁴² In another paragraph, ADRP 6-0 states that commanders are guided by the *principles of mission command* to skillfully balance of the Art of Command with the Science of Control and use *mission command philosophy* to exercise authority and master the systems and procedures that help forces accomplish missions.⁴³

The concept of the Art of Command in these publications seems to match the concept of Mission Command as defined by this paper and past Army Doctrine. Likewise, the Science of Control concept matches Detailed Command.⁴⁴ Developing a model that determines how military operations relate to art and science will assist commanders in applying command concepts to best meet demands on the battlefield.

In current doctrine, the Science of Control is defined as the regulation of forces and warfighting functions to synchronize and integrate actions. It is based on objectivity, facts, empirical methods, and analysis. The Science of Control is used to

overcome physical and procedural constraints, such as movement rates, fuel consumption, weapons effects, rules of engagement, and legal considerations. The Science of Control is used to understand things that can be analyzed and measured; in other words, how systems and components are coupled in a linear system.⁴⁵

The Art of Command, in current doctrine, is used to deal with the unpredictability of human behavior and how human endeavors are characterized by the continuous, mutual adaptation of give and take, moves, and countermoves among all participants.⁴⁶ It uses judgment to assess situations, draw feasible conclusions, and make decisions⁴⁷. The Art of Command is the type of Command and Control method required for operating in a non-linear system with complex interactions.

Mission Command Philosophy is intended to tie both art and science together and enable commanders to balance the two command concepts. However, the philosophy of Mission Command is superficially defined, consisting of only three sentences in ADP 6-0 and eight in ADRP 6-0. Generally, the philosophy states that successful commanders must use leadership to develop teams and establishes mutual trust understanding throughout their units. By providing clear intent, commanders guide subordinates' actions and promote freedom of action and initiative (Mission Command). Subordinate leaders, who understand their commander's intent and the overall objective, are able to adapt to rapidly changing situations to exploit fleeting opportunities (Mission Command). Commanders give their subordinate the latitude to accomplish assigned tasks in a manner that best fits the situation (Mission Command). Subordinates and staffs have an obligation to coordinate, synchronize, and integrate their actions with the rest of the force (Detailed Command). Likewise, commanders will

influence the situation and provide direction and guidance while synchronizing their own operations (Detailed Command). Commanders will encourage subordinates to take action and accept prudent risks to create opportunity and to seize the initiative. Finally, commanders at all levels need education, rigorous training, and experience to apply these principles effectively.⁴⁸

It is very encouraging that the doctrine makes allowances for both Mission Command (Art of Command) and Detailed Command (Science of Control). Without a better definition of when and how the two concepts should and must be used, the doctrine places the burden of determination on the commanders. Multiple commanders, throughout the levels of command and across the force, will attempt to balance the Art of Command and the Science of Control independently which may result in confusion. However, by using organizational systems theory to better define the Mission Command Philosophy, the Army will give commanders the ability to build a mental framework to clearly understand when and where the Science of Control and the Art of Command diverge.

Recommendations

By further developing systems theory and the modified Perrow Interaction Coupling Chart into a framework for understanding complex systems and how interaction and coupling effect Command and Control, the Army can give commanders the critical tool needed to understand where the Art of Command and the Science of Control diverge. Both concepts are already in the doctrine, yet the vital piece missing is how to properly delineate and determine the limits to science and control.

The Army's move to the Mission Command concept is beneficial to the execution of Command and Control in a complex operating environment such as those military

operations which lay in the Splintered Quadrant. Greater flexibility, freedom, and speed of action, as well as the use of initiative, will increase the chance of success and minimize risk in uncertain operational environments. However, not all military operations and systems are in the Splintered Quadrant, and the Army should not limit itself to a single Command and Control concept. Many military operations are well suited to, and are more likely to achieve success when Detailed Command is used.

By building a mental framework based on systems theory and the modified Perrow Interaction Coupling Chart, commanders can identify the type of system and sub-systems interactions in an operation and determine which Command and Control concept is most appropriate. Once the idea of multiple Command and Control concepts is inculcated into the Army's collective mental framework, leaders at all levels will understand when and why they Detailed Command should be used, when they should use Mission Command, and when they must use a hybrid of both.

Using multiple Command and Control concepts will streamline operations, which currently have a Command and Control identity crisis. The Army must eliminate the confusion a commander may have when thinking with mission command, while the higher headquarters is giving specific and Detailed Command. However, the Army will achieve more efficiency, synchronization, and synergy by developing in Mission Command doctrine a model that enables leaders to understand how to apply Command and Control techniques to fit the systems environment. Commanders will understand that it is better to use Detailed Command in a particular phase or task to create unity of effort and maximized synchronization. In other areas of the operation, using Mission Command will enable the synergy that a less centralized command and control creates.

Army leaders are flexible enough to understand that Brigade level and above may be operating under Mission Command, but Battalion level and below can be operating under Detailed Command.

Conclusion

Every military operation must be approached in a different way for planning and Command and Control, depending on the environmental coupling and complexity. It is dangerous to assume that Detailed Command or Mission Command will always work, in every situation. Current Army doctrine accounts for both of these concepts in the Art of Command and the Science of Control, but still lacks a proper model to assist commanders in determining how to correctly apply the concepts based on the operational environment. The Army must further develop organizational systems theory into a tool that commanders can use to understand how the art and science work on the battlefield. This will allow the doctrine of Mission Command to become even more flexible to learning and operating in complex systems. This tool will assist commanders to identify the interactions in the system and determine which Command and Control concepts will best achieve success and accomplish the mission. The alternative is having Mission Command—an otherwise excellent doctrine—increase operational risk due to avoidable confusion in the selection of the appropriate Command and Control concept for the situation.

Endnotes

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⁶ A.N. Mertsalov, "Jomini versus Clausewitz" from *Russia: War Peace and Diplomacy: Essays in Honour of John Erickson* by Mark and Ljubica Erickson (London: Weidenfeld & Nicolson, 2004) 14.

⁷ Tim Lupfer, *The Dynamics of Doctrine: The Changes in German Tactical Doctrine During the First World War* (Fort Leavenworth, KS: U.S. Army Command and General Staff College, 1981) 1-54.

⁸ Robert Allan Doughty, *The Seeds of Disaster: The Development of French Army Doctrine, 1919-1939* (Hamden, CT: Archon Books, 1985), 3-4.

⁹ Christopher W. Wilbeck, *Command in the Objective Force* (Fort Leavenworth, KS: School of Advanced Military Studies, United States Army Command and General Staff College, Spring 2003)

¹⁰ John Whiteclay Chambers and Fred Anderson, *The Oxford companion to American military history* (New York, NY: Oxford University Press, 1999) 720.

¹¹ Keegan, *The American Civil War: A Military History*, 97.

¹² Major George W. Eisel IV, *Befehlstaktik and the Red Army Experience: Are There Lessons for Us?* (Fort Leavenworth, KS: School of Advanced Military Studies, United States Army Command and General Staff College, April 19 1992) 17. The Soviet method of command is sometimes referred to as *Befehlstaktik* (Command Tactics), as opposed to *Auftragstaktik* (mission tactics).

¹³ Richard D. Hooker Jr. ed., *Maneuver Warfare: An Anthology* (Novato, CA: Presidio, 1993) 5

¹⁴ Robert R. Leonhard, *Fighting by Minutes: Time and the Art of War* (Westport, CT: Praeger, 1994) 117. "Mission tactics in the U.S. Army is no longer a doctrine. It is a religion."

¹⁵ U.S. Department of the Army, *Mission Command*, ADP 6-0, v. "Historically, military commanders have employed variations of two basic concepts of command: mission command and detailed command. While some have favored detailed command, the nature of operations and the patterns of military history point to the advantages of mission command."

¹⁶ U.S. Department of the Army, *Mission Command*, Army Doctrine Publication 6-0 (Washington, DC: U.S. Department of the Army, May 17 2012), 1

¹⁷ U.S. Joint Chiefs of Staff, *Mission Command White paper*, (Washington, DC: U.S. Joint Chiefs of Staff, April 3 2012)

¹⁸ U.S. Department of the Army, *Mission Command*, ADRP 6-0, 1-2

¹⁹ Ibid, 1-2

²⁰ U.S. Department of the Army, *Commander's Appreciation and Campaign Design*, 13

²¹ U.S. Department of the Army, *The Operations Process*, Army Doctrine Publication 5-0 (ADP 5-0) (Washington, DC: U.S. Department of the Army, May 17 2012), 7-9. Joint Operations are developed using the similar Joint Operation Planning Process (JOPP)

²² U.S. Department of the Army, *Commander's Appreciation and Campaign Design*, TRADOC Pamphlet 525-5-500 (Fort Monroe, VA: Training and Doctrine Command, January 28 2008), 13

²³ U.S. Department of the Army, *Mission Command: Command and Control of Army Forces*, FM 6-0, 1-15

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³⁰ Organization and system research that has a narrower focus than Perrow include Karl E. Weick (*Sensemaking in Organizations*, Sage 1995 and *Educational Organizations as Loosely Coupled Systems*, Administrative Science Quarterly 21, 1976), Orton JD and Weick K (*Loosely Coupled Systems: A Reconceptualization*, The Academy of Management Review, Vol. 15 1990), and Scott D. Sagan (*The Limits of Safety: Organizations, Accidents, and Nuclear Weapons* (Princeton University Press, 1993).

³¹ Perrow, *Complex Organizations*, 149.

³² Perrow, *Normal Accidents*, 72.

³³ Perrow, *Complex Organizations*, 150.

- ³⁴ Gareth Morgan, *Images of Organizations* (Newbury Park, CA: Sage Publications, 2006)
- ³⁵ Allen and Cunningham, *Systems Thinking in Campaign Design*, 10.
- ³⁶ Karl E. Weick and Kathleen M. Sutcliffe, *Managing the Unexpected - Assuring High Performance in an Age of Complexity*, (San Francisco, CA: Jossey-Bass, 2001) 10-17.
- ³⁷ Perrow. *Complex Organizations*, p.149, as modified by Dr. Chris Paparone (professor at the U.S. Army Command and General Staff College, ILE, Ft. Lee, VA) and the author. Combat Operations derived from several sources, including JP 3-0, JP 5-0, FM 3-0, and FM 5-0.
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- ³⁹ U.S. Joint Chiefs of Staff, *Department of Defense Dictionary of Military and Associated Terms*, Joint Publication 1-02, (Washington, DC: U.S. Joint Chiefs of Staff, 8 November 2010 as amended Through 31 January 2011)
- ⁴⁰ Leonhard, *Fighting by Minutes: Time and the Art of War*, 120
- ⁴¹ U.S. Department of the Army, *Mission Command*, ADRP 6-0, 2-2, 2-6, 2-7, 2-9.
- ⁴² Ibid, v, 1-2, 2-1, 2-13, 3-1, Glossary 3, *emphasis added*.
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- ⁴⁴ U.S. Department of the Army, *Mission Command: Command and Control of Army Forces*, FM 6-0, 1-12 and U.S. Department of the Army, *Commander's Appreciation and Campaign Design*, TRADOC Pamphlet 525-5-500, 13
- ⁴⁵ U.S. Department of the Army, *Mission Command*, ADRP 6-0, 2-12 thru 2-13.
- ⁴⁶ Ibid, 1-1.
- ⁴⁷ Ibid, 2-5 thru 2-12.
- ⁴⁸ Ibid, 1-4.